

RS-08-040

10 CFR 50.12

March 24, 2008

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Byron Station, Units 1 and 2
Facility Operating License Nos. NPF-37 and NPF-66
NRC Docket Nos. STN 50-454 and STN 50-455

Subject: Request for Exemption to Support Use of AXIOM™ Cladding Material

- References:
1. Letter from J. A. Bauer (Exelon Generation Company, LLC) to NRC, "Request for Exemption from Cladding Material Specified in 10 CFR50.44, 10 CFR50.46 and 10 CFR 50 Appendix K," dated September 23, 2005
 2. Letter from R. F. Kuntz (NRC) to C. M. Crane (Exelon Generation Company, LLC), "Byron Station, Unit Nos. 1 and 2 – Exemption from the Requirements of 10 CFR 50.44, 10 CFR 50.46, and 10 CFR Part 50, Appendix K (TAC Nos. MC8517 and MC8518)," dated June 30, 2006
 3. Letter from J. B. Archie (South Carolina Electric & Gas Company) to NRC, "Request for Burnup Extension of Exemption Request," dated May 31, 2007
 4. Letter from R. E. Martin (NRC) to J. B. Archie (South Carolina Electric & Gas Company, "Virgil C. Summer Nuclear Station, Unit No. 1 – Exemption from the Requirements of 10 CFR Part 50, Sections 50.44, 50.46, and Appendix K (TAC No. MD5699)," dated March 13, 2008

In Reference 1, Exelon Generation Company, LLC (EGC) requested an exemption from the requirements of 10 CFR 50.44, "Standards for combustible gas control system in light-water-cooled power reactors," 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," and 10 CFR 50 Appendix K, "ECCS Evaluation Models," for Byron Station. The exemption was necessary to support EGC's plans to use four lead test assemblies (LTAs) containing fuel rods clad with AXIOM™ cladding material in Byron Station, Unit 1, Cycle 15. The exemption request also supported reinsertion of the AXIOM™ LTAs into Byron Station, Units 1 and 2, for a second cycle of operation following removal from the Unit 1 Cycle 15 reactor core. The NRC granted the exemption in Reference 2.

In accordance with 10 CFR 50.12, "Specific exemptions," EGC is requesting an exemption from the requirements of 10 CFR 50.46 and 10 CFR 50, Appendix K, to support a third cycle of irradiation of AXIOM™ clad fuel rods from the original LTAs, and to support use of fresh AXIOM™ clad fuel rods in a host assembly for one cycle. Specifically, after the second cycle of operation, EGC plans to reinsert up to 16 AXIOM™ clad fuel rods from the original LTAs into a host assembly, with the remaining rods of the host assembly being fresh AXIOM™ clad fuel rods. The host assembly will then be inserted into the Unit 2 Cycle 16 reactor core for a third cycle to obtain high burnup data. During the third cycle, the twice-burned AXIOM™ clad fuel rods will reach a lead rod average burnup of up to 75,000 megawatt days per metric ton uranium (MWD/MTU). The host assembly AXIOM™ clad fuel rods will reach an average burnup of approximately 27,500 MWD/MTU during Unit 2 Cycle 16.

There are no specific Technical Specifications or license conditions that impose a limit on fuel rod burnup. However, the exemption granted in Reference 2 was based on plans to irradiate the LTAs, containing a total of 64 AXIOM™ clad fuel rods, for only two cycles of operation. The Attachment provides the justification for the request to irradiate up to 16 of the AXIOM™ clad fuel rods for a third cycle, during which the rods will reach a lead rod average burnup of up to 75,000 MWD/MTU. The Attachment also demonstrates that the bases of the Reference 1 exemption request remains valid with the increase in the total number of AXIOM™ clad fuel rods to be used in the reactor core (i.e., since all rods in the host assembly will be either fresh or twice-burned AXIOM™ clad fuel rods). Since 10 CFR 50.44 has been revised such that it does not refer to specific types of zirconium cladding, there is no longer a need for an exemption from 10 CFR 50.44.

The request to support a lead rod average burnup of up to 75,000 MWD/MTU is similar to a request submitted by South Carolina Electric & Gas Company for the Virgil C. Summer Nuclear Station in Reference 3. In Reference 4, the NRC approved the request for the Virgil C. Summer Nuclear Station.

The reinsertion of the AXIOM™ clad fuel rods for the third cycle is currently scheduled to occur during the Spring 2010 refueling outage for Byron Station Unit 2. In order to allow adequate time for the core design process and fuel assembly reconstitution, EGC requests approval of the exemption request by March 24, 2009.

There are no regulatory commitments contained in this letter. If you have any questions concerning this letter, please contact Mr. Kenneth M. Nicely at (630) 657-2803.

Respectfully,

A handwritten signature in black ink, appearing to read "Patrick R. Simpson". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Patrick R. Simpson
Manager – Licensing

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Overview

In Reference 1, the NRC granted an exemption from the requirements of 10 CFR 50.44, "Standards for combustible gas control system in light-water-cooled power reactors," 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," and 10 CFR 50 Appendix K, "ECCS Evaluation Models," for Byron Station. Specifically, the exemption supports use of four lead test assemblies (LTAs) containing fuel rods clad with AXIOM™ cladding material in the Byron Station, Unit 1 Cycle 15 core. The exemption also supported reinsertion of two of the four AXIOM™ LTAs into the Unit 1 Cycle 16 core, and two of the four AXIOM™ LTAs into the Unit 2 Cycle 15 core, for a second cycle. The exemption granted in Reference 1 was based on plans to irradiate the LTAs, containing a total of 64 AXIOM™ clad fuel rods, for only two cycles of operation.

Specific Exemption Request

In accordance with 10 CFR 50.12, "Specific exemptions," Exelon Generation Company, LLC (EGC) is requesting an exemption from the requirements of 10 CFR 50.46 and 10 CFR 50, Appendix K, to support a third cycle of irradiation of up to 16 AXIOM™ clad fuel rods from the original LTAs. EGC also requests approval to use for this irradiation a host assembly composed of AXIOM™ clad fresh fuel rods for one cycle of operation.

Specifically, after the second cycle of operation, EGC plans to reinsert up to 16 twice-burned AXIOM™ clad fuel rods from the original LTAs into a host assembly, with the remaining rods of the host assembly being fresh AXIOM™ clad fuel rods. The host assembly will then be inserted into the Unit 2 Cycle 16 reactor core for its initial cycle to obtain high burnup data. During Unit 2 Cycle 16, the twice-burned AXIOM™ clad fuel rods will reach a lead rod average burnup of up to 75,000 megawatt days per metric ton uranium (MWD/MTU). The host assembly AXIOM™ clad fuel rods will reach an average burnup of approximately 27,500 MWD/MTU during Unit 2 Cycle 16.

Basis for Exemption Request

The four LTAs currently in the Unit 1 Cycle 15 reactor core are identical to the existing fuel assembly design, except that 16 fuel rods in each assembly are clad with Westinghouse AXIOM™ alloy cladding material. In Reference 2, EGC provided specific details regarding the LTAs and the AXIOM™ cladding material, including material properties, corrosion, and thermal creep.

Byron Station Unit 1 is currently operating in Cycle 15, and the next refueling outage (i.e., B1R15) is scheduled to begin in March 2008. During refueling outage B1R15, the four LTAs will be removed and inspected, as discussed in Reference 2. Two of the four LTAs will be reinserted into the core for Unit 1 Cycle 16 for a second cycle of irradiation.

Post-irradiation examination (PIE), as discussed in Reference 2, will be performed for the remaining two LTAs. If no adverse observations are found relative to current licensed fuel performance code predictions, these two LTAs will be inserted into the Unit 2 core for Cycle 15, which is scheduled to begin in October 2008, for a second cycle of irradiation.

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Following removal of the LTAs from the Unit 1 Cycle 16 core, PIE will be performed. Up to 16 AXIOM™ clad fuel rods from the original LTAs will be selected and reconstituted into a new host assembly to support a third cycle of irradiation. The remaining fuel rods in the new host assembly will be clad in fresh AXIOM™ cladding material. EGC plans to insert the new host assembly into the Unit 2 Cycle 16 core to obtain high burnup data. During the third cycle, the twice-burned AXIOM™ clad fuel rods will reach a lead rod average burnup of up to 75,000 MWD/MTU.

Lead Test Assembly Conditions

The purpose of irradiating the twice-burned AXIOM™ clad fuel rods in a fresh LTA is to: (1) evaluate the AXIOM™ clad fuel rod performance at projected rod burnups between 72,000 to 75,000 MWD/MTU, (2) collect fuel clad profilometry data after one cycle for the fresh rods and after three cycles for the high burnup rods, and (3) evaluate AXIOM™ clad integral fuel burnable absorber (IFBA) fuel rod performance.

The fresh LTA with up to 16 twice-burned AXIOM™ clad fuel rods will be located at the center of the core. The LTA lead rod average burnup is estimated to be approximately 50,000 MWD/MTU at the beginning of the third cycle (i.e., Unit 2 Cycle 16), and less than 75,000 MWD/MTU at the end of the third cycle.

Pre-characterization of the twice-burned AXIOM™ fuel rods will be performed prior to insertion into the Unit 2 Cycle 16 core. It will include an overall visual examination, and measurements of cladding oxide, fuel rod growth, and diameter profile. Prior to irradiating the LTA in Unit 2 Cycle 16, the twice-burned AXIOM™ clad fuel rods will be evaluated with current fuel performance methods and codes to ensure that all current design criteria are met for the projected burnup. If some of the AXIOM™ clad twice-burned rods scheduled for reconstitution exhibit anomalous behavior, have measured characteristics of oxide thickness or rod length that are outside acceptable bounds, or are determined incapable of meeting all current design requirements, those twice-burned rods will not be used for reconstitution and will be replaced with rods meeting the reload requirements.

The PIE of the LTA (i.e., after three cycles of operation for up to 16 AXIOM™ clad fuel rods, and after one cycle of operation for the remaining AXIOM™ clad fuel rods of the host assembly) will include measurements of cladding oxide, fuel rod growth, fuel rod profilometry, and overall visual examinations.

Justification for the Exemption

There are no specific Technical Specifications or license conditions that impose a limit on fuel rod burnup. The exemption granted in Reference 1 was based on plans to irradiate the LTAs containing AXIOM™ clad fuel rods for only two cycles of operation. However, as discussed below, the justification for the exemption (i.e., the exemption is authorized by law, the exemption will not present an undue risk to the public health and safety, and the exemption is consistent with the common defense and security) and the special circumstances discussed in Reference 2 continue to apply to the host LTA with a lead rod average burnup of up to 75,000 MWD/MTU.

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10 CFR 50.12 states that the NRC may grant exemptions from the requirements of the regulations of this part provided three conditions are met:

- the exemption is authorized by law,
- the exemption will not present an undue risk to the health and safety of the public, and
- the exemption is consistent with the common defense and security.

In addition, the NRC will not consider granting an exemption unless special circumstances are present. The requested exemption satisfies these criteria as described below.

1. The exemption is authorized by law.

Selection of a specific cladding material in 10 CFR 50.46, and implied in 10 CFR 50, Appendix K, was at the discretion of the NRC consistent with its statutory authority. No statute required the NRC to adopt this specification. Additionally, the NRC has the authority under 10 CFR 50.12 to grant exemptions from the requirements of Part 50 with the provision of proper justification. Furthermore, this request does not seek an exemption from the acceptance and analytical criteria of 10 CFR 50.46 and 10 CFR 50, Appendix K. The request is intended only to allow application of these regulations to AXIOM™ cladding material.

2. The exemption will not present an undue risk to public health and safety.

The LTA safety evaluation will ensure that the acceptance criteria of 10 CFR 50.46 and 10 CFR 50, Appendix K, are met following insertion of the assembly containing AXIOM™ cladding material. Fuel assemblies using AXIOM™ cladding will be evaluated using NRC-approved analytical methods and will address the changes in the cladding material properties. The safety analysis for Byron Station is supported by the applicable Technical Specifications. The Byron Station reload core containing AXIOM™ cladding will continue to be operated in accordance with the operating limits specified in the Technical Specifications. The LTA will be placed in a non-limiting core location. Therefore, this exemption will not pose an undue risk to public health and safety.

3. The exemption is consistent with the common defense and security.

The exemption request is only to allow application of regulatory requirements to a variant cladding material. Requirements and acceptance criteria of 10 CFR 50.46 and 10 CFR 50, Appendix K, will be maintained. Special nuclear material in the LTA will continue to be handled and controlled in accordance with approved procedures. Use of the LTA in the Unit 2 Cycle 16 reactor core will not affect plant operations and is consistent with maintaining the common defense and security.

Special Circumstances

10 CFR 50.12(a)(2) states that the NRC will not consider granting an exemption to the regulations unless special circumstances are present. The requested exemption meets the special circumstances of 10 CFR 50.12(a)(2)(ii) which states that, "Application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not

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necessary to achieve the underlying purpose of the rule." In this particular circumstance, application of the subject regulations is not necessary to achieve the underlying purpose of the regulations.

10 CFR 50.46 identifies acceptance criteria for Emergency Core Cooling Systems (ECCS) performance at nuclear power plants. Consistent with EGC's core design process, EGC will continue to evaluate the loss-of-coolant accident (LOCA) analysis, prior to insertion of the LTA into the Unit 2 Cycle 16 reactor core, to ensure the assembly is bounded by the analysis of record. Therefore, the ECCS performance of Byron Station Unit 2 will not be affected by insertion of the LTA containing AXIOM™ clad fuel rods.

10 CFR 50, Appendix K, paragraph I.A.5 applies an equation for rates of energy release, hydrogen generation, and cladding oxidation from a metal-water reaction that conservatively bounds all post-LOCA scenarios. The requested exemption will allow application of this equation to AXIOM™ clad fuel.

Technical Justification for Extended Fuel Rod Burnup

Fuel rod design criteria that become more limiting for high burnup fuel rods include fuel rod growth, clad fatigue, rod internal pressure and cladding corrosion. Evaluations have been performed using NRC approved fuel rod design methodologies to confirm that the fuel rods design limits are met. These models have been used to perform similar evaluations for other high burnup LTAs.

Figure 1 presents the peak oxide measurements for Zircaloy-4, Standard ZIRLO™, and Optimized ZIRLO™ compared to measurements taken of the Virgil C. Summer Nuclear Station (VCSNS) AXIOM™ and Optimized ZIRLO™ LTAs, with adjustments. Adjustments were made for uncertainties in the measurements. Specifically, these were the first AXIOM™ oxide measurements made in-reactor; measurements were adjusted so that all of the scans started with a common level at the bottom of the rod. The adjustments were not significant and resulted in changes in the measurements of about 4 microns. Optimized ZIRLO™ shows significantly lower corrosion than Standard ZIRLO™. At burnups above 50,000 MWD/MTU, the Optimized ZIRLO™ cladding has at least 30-50% lower oxide thickness than the Standard ZIRLO™ cladding. For VCSNS, both AXIOM™ and Optimized ZIRLO™ have similar behavior and hence, it is predicted that AXIOM™ cladding will also have lower oxide thickness compared to Standard ZIRLO™ cladding at burnups above 70,000 MWD/MTU.

An evaluation was performed to demonstrate that the VCSNS AXIOM™ oxide thickness data should bound the Byron Station AXIOM™ LTA. Specifically, the fuel duty index (FDI) for both plants were compared based on the current operational conditions of Byron Station Units 1 and 2, the assumed operational conditions for Byron Station Unit 2 Cycle 16, and the operational conditions for VCSNS for Cycles 16, 17, and 18. The FDI is a tool used to more accurately compare in-reactor performance and is specifically utilized for advanced alloy development. The FDI provides a simplified corrosion model that uses oxide surface temperatures, operating times, and boiling conditions to calculate a relative fuel duty number. Westinghouse experience has shown that the peak oxide thickness is strongly related to fuel duty and is not just based on the maximum burnup level. The comparison concluded that based on the assumed Byron Station operational conditions, the rod peak oxide on the Byron

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AXIOM™ LTA during the third cycle of irradiation will not exceed the oxide measurements for similar burnup levels at VCSNS.

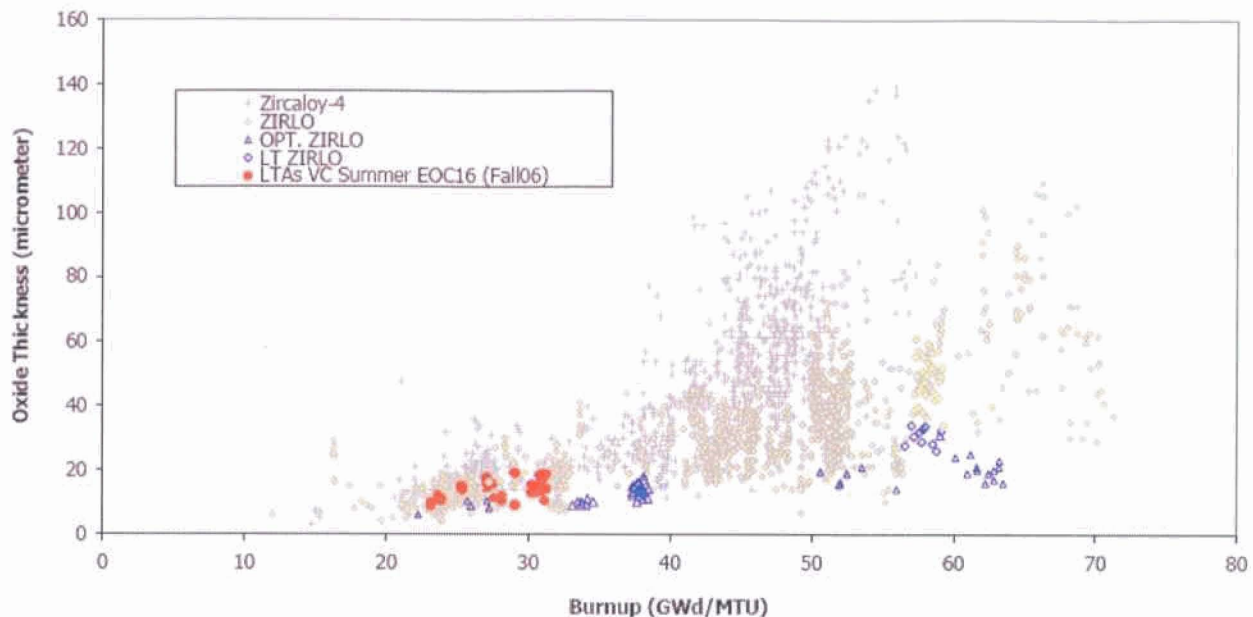


Figure 1: Peak Oxide Measurements versus Burnup

The new LTA that will be inserted into the Byron Station Unit 2 Cycle 16 reactor core will contain up to 16 twice-burned AXIOM™ clad fuel rods from the original LTAs; the remaining fuel rods will be clad in fresh AXIOM™ cladding material. Consistent with EGC's core design process, the AXIOM™ clad high burnup fuel rods will only be used if evaluations conclude that applicable design criteria, including the ability to maintain a coolable geometry and meeting the plant dose criterion, are met and clad integrity is maintained.

The effects of burnup levels up to 75,000 MWD/MTU on source terms and associated doses are discussed in Reference 3. The assessment concluded that the fuel handling accident (FHA) total effective dose equivalent (TEDE) doses are not adversely affected by extended burnup. For accidents other than the FHA, even though there are variations in core inventories of isotopes due to extended burnup up to 75,000 MWD/MTU, there are no significant increases of isotopes that are major contributors to accident doses. It is noteworthy that, at higher burnups, there is actually a reduction in certain isotopes that are major dose contributors under accident situations (e.g., Kr-88). With less than 1% AXIOM™ clad rods in the entire core, variation of isotopes will be extremely small. Thus, the radiation dose limitations of 10 CFR 50.67, "Accident source term," will not be exceeded. The use of an LTA with AXIOM™ clad fuel rods at higher burnup will not result in an increase of radiological consequences.

Conservatism in the Byron FHA dose calculation are discussed below. These conservatisms compensate for uncertainty in gap inventory, due to the limited fission gas release measurements on high burnup fuel.

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Conservatisms in Byron FHA Calculation

The Byron Station dose consequences for the FHA are evaluated using alternative source term (AST) and Regulatory Guide 1.183 (i.e., Reference 4). Limiting results (i.e., 0 - 2 hour TEDE doses at the exclusion area boundary) are predicted for the FHA within containment. As discussed in Reference 5, gap release fractions used in the analysis are two times the Regulatory Guide 1.183 Table 3 values for non-LOCA accidents. The factor of two was used to offset the fact that some fuel assemblies would exceed rod power/burnup criteria in Regulatory Guide 1.183. For the FHA, all of the fuel rods in the limiting assembly are assumed to fail, releasing their fuel/clad gap fission product inventory.

There are a number of conservatisms in the existing FHA dose calculation in addition to the doubling of the gap fractions. These include, but are not limited to, conservatisms associated with the following items:

- Assembly relative power,
- Offload time,
- Containment isolation, and
- Mechanical fuel damage due to impact.

Each of these conservatisms is described in more detail below.

Assembly Relative Powers

Due to its high burnup, the LTA's relative power will not approach the 1.7 peaking limit assumed in the Updated Final Safety Analysis Report (UFSAR). The Byron Station Unit 2 Cycle 16 reactor core will be designed such that the LTA will remain in a non-limiting location. Therefore, with more appropriate relative assembly powers credited for both the LTA and other potentially impacted assemblies, the calculated dose would decrease.

Offload Time

The FHA calculation assumes that core offload begins no sooner than 48 hours after shutdown. In practice, core offload typically commences much later than 48 hours after entry into Mode 3.

Containment Isolation

The movement of "Recently Irradiated Fuel" (i.e., fuel that has occupied part of a critical reactor core within the previous 48 hours) requires that containment integrity be in effect. Fuel with additional decay can be moved without containment integrity or exhaust filtration. Compensatory measures to close any openings and ensure exhaust is in the proper direction within one hour after a FHA are procedurally required as defense-in-depth measures. However, although these measures are required, they are not credited in the analysis in accordance with Regulatory Guide 1.183.

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Mechanical Fuel Damage Due To Impact

The UFSAR analysis assumes all rods of the dropped assembly fail. This is a very conservative assumption given the broad spectrum of loads considered and the resulting high structural strength of the fuel assembly and other core components. Irradiated fuel assembly drop events (e.g., Fort Calhoun in 2003, North Anna in 2001, and Haddam Neck in 1986) have also yielded no increase in local area dose rates.

Summary of Conservatisms

There are a number of conservatisms within the existing FHA dose calculation. Also, Regulatory Guide 1.183 Table 3 non-LOCA gaps fractions were increased by a factor of two for conservatism. For the third cycle of irradiation for the AXIOM™ fuel rods, the LTA will be placed in a non-limiting core location and would be operating at a power level less than that assumed. No credit is taken for containment integrity or operability during fuel movement. There will be significant decay afforded prior to discharging these high burnup assemblies. Therefore, the existing conservatisms are adequate to compensate for the uncertainty in gap inventory, due to limited fission gas release measurements on high burnup fuel.

Technical Justification for Use of Fresh AXIOM™ Clad Rods in Host Assembly

The Byron Station Unit 2 reactor core contains a total of 193 fuel assemblies. It is planned that one LTA containing 264 AXIOM™ clad rods will be placed in the Unit 2 Cycle 16 reactor core in a non-limiting core location. This limited number of AXIOM™ rods to be placed in the core will be a sufficient amount to obtain data while maintaining a high degree of confidence that no safety concerns exist. Setting the number of AXIOM™ clad rods at this level restricts the total number of rods to a value much less than 10% of the core (i.e., 264 out of 50,952 rods = 0.52%), which is well within postulated core damage frequency scenarios (e.g., for a 193 assembly core with 264 fuel rods per assembly; 5095 rods would need to fail to exceed the 10% core damage frequency). Even though 264 rods would be well within a 10% core damage frequency scenario, it is not suggested that these rods are anticipated to fail, based on the testing to date. This discussion is provided only to demonstrate that there is no undue risk to the public health and safety, in terms of either fuel integrity or potential core damage, in operating this number of rods in the proposed LTA.

There have been no AXIOM™ clad fuel rod failures in the industry to date. The most plausible potential failure would be a limited number of fuel rods that may fail due to a specific and limited condition (e.g., excessive oxidation, although this is not anticipated based on testing to date). Since it is not anticipated that any of the AXIOM™ clad fuel rods would fail in this LTA, any single failure that may occur would yield valuable data. If any failure occurred, their effects would be well within the Technical Specification limits for doses and in all cases, core coolable geometry would be maintained.

Environmental Assessment

In accordance with 10 CFR 51.30, "Environmental assessment," and 10 CFR 51.32, "Finding of no significant impact," the following information is provided in support of an environmental assessment and finding of no significant impact for the proposed action.

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The proposed action would grant exemptions from requirements of 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," and 10 CFR Part 50, Appendix K, "ECCS Evaluation Models," to allow the use of one lead test assembly (LTA) in the Byron Station, Unit 2 Cycle 16, reactor core. The LTA will contain up to 16 twice-burned AXIOM™ clad fuel rods, and the remaining rods of the LTA will be fresh AXIOM™ clad fuel rods. During Unit 2 Cycle 16 operation, the twice-burned AXIOM™ clad fuel rods will reach a lead rod average burnup of up to 75,000 megawatt days per metric ton uranium (MWD/MTU). The LTA AXIOM™ clad fuel rods will reach an average burnup of approximately 27,500 MWD/MTU during Unit 2 Cycle 16.

The requested exemption is needed because Exelon Generation Company, LLC (EGC) intends to place the LTA in a non-limiting core location of the Unit 2 Cycle 16 reactor core. The purpose of irradiating the twice-burned AXIOM™ clad fuel rods in a fresh LTA is to: (1) evaluate the AXIOM™ clad fuel rod performance at projected rod burnups between 72,000 to 75,000 MWD/MTU, (2) collect fuel clad profilometry data after one cycle for the fresh rods and after three cycles for the high burnup rods, and (3) evaluate AXIOM™ clad integral fuel burnable absorber (IFBA) fuel rod performance.

The principal alternative to the proposed action would be to deny the requested exemption and require adherence to the current 10 CFR 50.46 and 10 CFR Part 50, Appendix K, requirements. Denial of the exemption request would result in no change in environmental impacts.

Regarding alternative use of resources, granting the requested exemption will not involve the use of resources not previously considered in the Final Environmental Statement for Byron Station (i.e., Reference 6).

The proposed action (i.e., granting the exemption request) will not significantly increase the probability or consequences of accidents, no changes are being made in the types or quantities of any radiological effluents that may be released offsite, and there is no significant increase in occupational or public radiation exposure. Therefore, there are no significant radiological environmental impacts associated with the proposed action.

The proposed action does not affect non-radiological plant effluents and has no other environmental impact. Therefore, there are no significant non-radiological impacts associated with the proposed action.

The environmental impacts of the proposed action and the alternative action are similar. Based on the assessment presented above, the proposed action will not have a significant effect on the quality of the human environment.

Conclusion

EGC is proposing to insert one LTA into a non-limiting core location for Byron Station, Unit 2 Cycle 16, operation. The LTA will contain up to 16 twice-burned fuel rods clad with AXIOM™ cladding material. The remaining fuel rods in the LTA will be clad in fresh AXIOM™ cladding material. Based on the above assessment, granting an exemption to support a third cycle of irradiation of up to 16 AXIOM™ clad fuel rods, and to support use of fresh AXIOM™ clad fuel rods in a host assembly for one cycle, is justified since fuel design limits will continue to be met.

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As demonstrated above, this exemption request is in accordance with the criteria of 10 CFR 50.12. Specifically, the requested exemption is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security. Also, special circumstances are present as previously described.

References

1. Letter from R. F. Kuntz (NRC) to C. M. Crane (Exelon Generation Company, LLC), "Byron Station, Unit Nos. 1 and 2 – Exemption from the Requirements of 10 CFR 50.44, 10 CFR 50.46, and 10 CFR Part 50, Appendix K (TAC Nos. MC8517 and MC8518)," dated June 30, 2006
2. Letter from J. A. Bauer (Exelon Generation Company, LLC) to NRC, "Request for Exemption from Cladding Material Specified in 10 CFR50.44, 10 CFR50.46 and 10 CFR 50 Appendix K," dated September 23, 2005
3. WCAP-12610-P-A, "VANTAGE+ Fuel Assembly Reference Core Report," dated April 1995
4. NRC Regulatory Guide 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," dated July 2000
5. Letter from R. F. Kuntz (NRC) to C. M. Crane (Exelon Generation Company, LLC), "Byron Station, Unit Nos. 1 and 2, and Braidwood Station, Unit Nos. 1 and 2 – Issuance of Amendments Re: Alternative Source Term (TAC Nos. MC6221, MC6222, MC6223, and MC6224)," dated September 8, 2006
6. NUREG–0848, "Final Environmental Statement related to the operation of Byron Station, Units 1 and 2," dated April 1982